

What is claimed is:

1. A noise removal circuit comprising:
  - a 180-degree odd multiple shifting section for outputting a 180-degree shifted signal that is phase-shifted from an input signal by an odd multiple of 180 degrees; and
    - a difference output section for outputting a difference between the input signal and the 180-degree shifted signal.
2. A noise removal circuit comprising:
  - a 360-degree shifting section for outputting a 360-degree shifted signal that is phase-shifted from an input signal by an integral multiple of 360 degrees; and
    - a sum output section for outputting a sum of the input signal and the 360-degree shifted signal.
- 20 3. A noise removal circuit comprising:
  - a 180-degree odd multiple shifting section for outputting a 180-degree shifted signal that is phase-shifted from an input signal by an odd multiple of 180 degrees;
  - 25 a 360-degree shifting section for outputting a 360-degree shifted signal that is phase-shifted from the input signal by an integral multiple of 360 degrees;

and

a calculation output section for outputting calculation results of a difference between the input signal and the 180-degree shifted signal and of a sum 5 of the input signal and the 360-degree shifted signal.

4. The noise removal circuit according to claim 1, further comprising a synchronizing signal output section for outputting a synchronizing signal for 10 synchronizing the input signal and the 180-degree shifted signal, wherein the difference output section output the difference in response to the synchronizing signal.

15 5. The noise removal circuit according to claim 3, further comprising a synchronizing signal output section for outputting a synchronizing signal for synchronizing the input signal and the 180-degree shifted signal, wherein the difference output section 20 output the difference in response to the synchronizing signal.

25 6. The noise removal circuit according to claim 2, further comprising a synchronizing signal output section for outputting a synchronizing signal for synchronizing the input signal and the 360-degree shifted signal, wherein the sum output section output

the sum in response to the synchronizing signal.

7. The noise removal circuit according to claim 3,  
further comprising a synchronizing signal output  
5 section for outputting a synchronizing signal for  
synchronizing the input signal and the 360-degree  
shifted signal, wherein the sum output section output  
the sum in response to the synchronizing signal.

10 8. The noise removal circuit according to any one of  
claims 4 to 7, wherein the synchronizing signal output  
section is constituted by a phase-locked loop circuit  
and generate the synchronizing signal based on the input  
signal.

15 9. The noise removal circuit according to any one of  
claims 4 to 7, wherein the synchronizing signal output  
section is constituted by a delay-locked loop circuit  
and generate the synchronizing signal based on the input  
20 signal.

10. The noise removal circuit according to any one of  
claims 1 to 7, wherein the input signal is a wobble  
signal for rotation control that is detected from a  
25 recording track of an optical disk.

11. The noise removal circuit according to claim 8,

wherein the input signal is a wobble signal for rotation control that is detected from a recording track of an optical disk.

5       12. The noise removal circuit according to claim 9, wherein the input signal is a wobble signal for rotation control that is detected from a recording track of an optical disk.

10      13. A noise removal method comprising:

          outputting a 180-degree shifted signal that is phase-shifted from an input signal by an odd multiple of 180 degrees; and

15      outputting a difference between the input signal and the 180-degree shifted signal.

14. A noise removal method comprising:

          outputting a 360-degree shifted signal that is phase-shifted from an input signal by an integral 20 multiple of 360 degrees; and

          outputting a sum of the input signal and the 360-degree shifted signal.

15. A noise removal method comprising:

25      outputting a 180-degree shifted signal that is phase-shifted from an input signal by an odd multiple of 180 degrees;

outputting a 360-degree shifted signal that is phase-shifted from the input signal by an integral multiple of 360 degrees; and

5. outputting calculation results of a difference between the input signal and the 180-degree shifted signal and a sum of the input signal and the 360-degree shifted signal.

16. The noise removal method according to any one of  
10 claims 13 to 15, wherein the input signal is a wobble signal for rotation control that is detected from a recording track of an optical disk.